



INL researchers helped secure charging stations for Idaho Falls Power's four Chevy Volts. Varied collaborations with the local utility give INL a test bed for research projects and let the utility benefit from cutting-edge research.

Local utility works with national lab on new energy projects

By Kortny Rolston, *INL Communications & Governmental Affairs*

Not long after Idaho Falls Power won a grant in 2009 to test smart grid technology, the utility's managers realized they needed help.

The multiyear grant is part of a U.S. [Department of Energy](#)-funded [Pacific Northwest Smart Grid Demonstration Project](#). It required the utility to install smart meters, in-home energy management devices, a solar panel with a battery storage system and other devices. The utility also needed to add new cybersecurity measures.

"It was daunting," said Jackie Flowers, general manager of [Idaho Falls Power](#). "Just putting the specifications together for the meters and integration components was complicated. We had to evaluate products from several vendors and found ourselves on the front lines of integrating multiple systems."

Flowers and her team turned to a neighbor – Idaho National Laboratory – for help.

Since 2009, INL researchers have assisted with several aspects of [the project](#), including evaluating digital meters and building new computer security firewalls.

"It's a good partnership for us," Flowers said. "We know how we need our system to work and INL knows the technology. We have worked with INL staff prior to this project in the important area of cybersecurity. They have an expertise we just don't have."

The goal of the Pacific Northwest project – one of 16 sponsored by DOE – is to modernize the country's aging electrical infrastructure and advance smart grid technology.

Idaho Falls Power and other utilities view the updates as one of the best ways to reduce costs and improve efficiency and reliability across the grid. For example, the new smart meters "talk" to a utility and send valuable information – including whether power is out in a particular section of the system. In the past, utilities relied on customers to call about outages.

"There was no way for the system to let us know about an outage in a neighborhood," Flowers said. "We know when a large part of our system like a substation goes out. Smart meters change that."

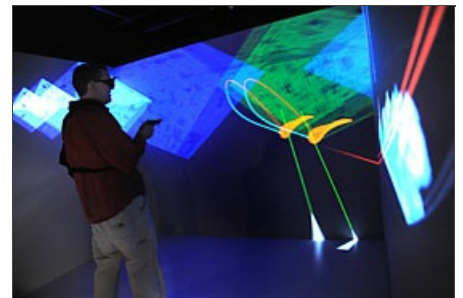
She pointed to a large outage that occurred last spring as an example.

A large windstorm swept through Idaho Falls and knocked out power around the city. Idaho Falls Power crews worked for several hours to fix the damage and thought they had restored power to everyone affected. It wasn't until the next day that they learned they had missed a neighborhood.

"We didn't realize we still we had some customers without power," Flowers said. "Our system indicated the power had been restored in the night. We don't call customers in the middle of the night to confirm – but meters could have correctly communicated that power restoration was not complete and we could have kept the crew there until the power was restored."

The relationship also has benefited INL. In some cases, Idaho Falls Power has become a test bed for research projects. INL researchers tested Sophia – a [new security protocol INL developed](#) – on the utility's control system and have worked with Idaho Falls Power on several projects.

"It's a symbiotic relationship," said Rita Wells, an INL cybersecurity researcher. "INL gains operational realities of a progressive community-owned municipal electric utility, and IFP gains insights into leading research and techniques



Idaho Falls Power beta-tested an INL tool that helps network operators detect anomalies that might threaten the security of utility control systems.



to mitigate emerging threats and vulnerabilities."

And INL researchers who conduct tests for DOE's [Advanced Vehicle Testing Activity](#) helped secure the charging stations needed to keep the four Chevy Volts that Idaho Falls Power purchased for the project running. (The charging stations can also collect data. The lab is working on agreements to gather this information and analyze the vehicles' charging patterns and energy consumption.)

"We do a lot of work with utilities all over the country and we wanted to work with Idaho Falls Power," said Matthew Shirk, an INL researcher. "One of the things we are evaluating is how these vehicles affect utilities and their loads."

To Flowers, smart grid is just the beginning. She would like to partner with INL on other projects, including testing a larger battery that can store electricity – particularly from wind and other renewable energy or even the city's hydro units – until it is needed. And cybersecurity (an area where INL and Idaho Falls Power have long collaborated) will continue to be a major focus.

INL researchers helped the local utility establish an advanced vehicle test project and may also evaluate the charging infrastructure.

"Our hydropower plants generate electricity all the time, even when demand is low," Flowers said. "If we could access storage to shape that generation resource to better match our demands, we could extract more value from those already proven resources."

Here are some joint INL/Idaho Falls Power projects:

Electrical Vehicle Testing

Idaho Falls Power purchased four Chevy Volts and charging stations. INL researchers helped the utility establish the test project and plan to evaluate the charging infrastructure. The goal is to establish benchmark data for technology modeling as well as research and development programs.

Testing Sophia

Idaho Falls Power beta tested Sophia, an INL-developed security protocol, on its industrial control systems for more than two years. It was the first utility to use the technology, and much of the information gathered helped INL researchers refine the tool. Sophia monitored the network traffic in Idaho Falls Power's control system to help operators determine if anomalies presented a threat. The project later expanded to test Sophia's capability of monitoring the radio frequency mesh network Idaho Falls Power built for the smart grid project.



Cybersecurity testing

INL security experts collaborated with Idaho Falls Power to develop firewall systems for the utility's supervisory control and data acquisition – or SCADA – system. They also helped evaluate and develop the utility's Advanced Metering Infrastructure, the network created to run the smart grid project.

Idaho Falls Power was one of the first utilities to test the Sophia tool, which is now being made available to the utility industry.

Renewable Energy

Idaho Falls Power works with INL researchers to collect and analyze data from three wind turbines and three solar panels, all of which feed into the utility's system. Two of the turbines and a solar panel are located at the [Center for Advanced Energy Studies](#) (CAES) building in Idaho Falls. The other two solar panels are located at Idaho Falls Power and the third [wind turbine is at Skyline High School](#) in Idaho Falls. A small battery system has been installed at the Idaho Falls Power office to test "shaping" the generation from the solar panel to better align with peak demands or nighttime electric vehicle charging.

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